CLAIMS

1. A focussing lens (100) for focussing a charged particle beam (7) onto a specimen (3) at a predetermined landing angle (42) comprising:

   at least a first electrode (26a, 9a; 105, 105a; 107) having a first aperture (106) to generate a focussing electric field (110) for focussing the charged particle beam (7) onto the specimen (3); and

   a correcting electrode having a curved surface (115) to compensate for landing angle dependent distortions of the focussing electric field (110) caused by the specimen.

2. The focussing lens (100) according to claim 1, whereby the curved surface (115) is cone-like shaped.

3. The focussing lens (100) according to any one of the preceding claims, whereby the curved surface (115) of the correcting electrode has an opening (118) on one side to provide space for the specimen (3) to approach the first electrode (26a, 9a; 105, 105a; 107).

4. The focussing lens (100) according to any one of the preceding claims, whereby the curved surface (115) of the correcting electrode is aligned to be rotationally symmetric with respect to the symmetry axis (8) of the first aperture (106).

5. The focussing lens (100) according to any one of the preceding claims, whereby the curved surface (115) of the correcting electrode encircles the symmetry axis (8) by a covering angle (120) of at most 350 degrees, preferably of at most 300 degrees, and even more preferred of at most 210 degrees.

6. The focussing lens (100) according to any one of the preceding claims, whereby the curved surface (115) of the correcting electrode encircles the symmetry axis (8) by a covering angle (120) of at least 10 degrees, preferably of at least 60 degrees, and even more preferred of at least 180 degrees.

7. The focussing lens (100) according to any one of the claims 5 or 6, whereby the covering angle (120) is taken within the plane of the first aperture (106).

8. The focussing lens (100) according to any one of the preceding claims, whereby the curved surface (115) of the correcting electrode is rigidly fastened to the at least first electrode (26a; 105, 105a).

9. The focussing lens according to any one of the preceding claims, whereby the at least first electrode (26a, 9a; 105, 105a; 107,) and the correcting electrode (115) are electrically connected to different voltage sources to provide for different voltages.

10. The focussing lens according to any one of the preceding claims, whereby the first electrode (26a, 105, 105a) is cone-like shaped.

11. The focussing lens according to any one of the preceding claims, whereby the curved surface (115) of the correcting electrode (115) faces the first electrode conformally.

12. The focussing lens according to any one of the preceding claims, whereby the distance D1 between the at least one first electrode (26, 105, 105a) and the facing curved surface (115) of the correcting electrode is smaller than 10 mm, preferably smaller than 4 mm and even more preferred smaller than 2 mm.

13. The focussing lens according to any one of the preceding claims, whereby the at least one first electrode (26, 105, 105a) and the correcting electrode (115) are arranged to withstand a voltage of at least 500 V, preferably of at least 2000V and even more preferred of at least 5000V between each other.

14. The focussing lens according to any one of the claims 10 to 13, whereby the curved surface (115) of the correcting electrode is shaped and positioned to cover more than 20%, preferably more than 40% and even more preferred more than 60% of the cone-like shaped first electrode (105a) to electrostatically shield said cone-like shaped first electrode (105a).

15. The focussing lens according to any one of the claims 3 to 14, whereby the opening (118) of the curved surface (115) of the correcting electrode is large enough to accommodate the specimen (3) closer to the at least one first electrode (105a) than the distance D1 between the first electrode (26a, 105a) and the curved surface (115) of the correcting electrode

16. The focussing lens according any one of the claims 3 to 15, whereby he rim (126) of the opening (118) in the curved surface (115) of the correcting electrode defines essentially a parabola.

17. The focussing lens according to any one of the preceding claims, whereby the specimen (3) is a planar device, like a semiconductor wafer or a mask for photolithographic processes, preferably having a diameter larger than 30 mm and preferably larger than 100 mm.

18. The focussing lens according to any one of the claims 2 to 17, whereby the vertex angle of the cone-like shaped correcting electrode (115) is between 30 degrees and 160 degrees, preferably between 60 degrees and 120 degrees, and even more preferred between 85 degrees and 95 degrees.

19. The focussing lens according to any one of the preceding claims, comprising a coil (26) for providing a focussing magnetic field for focussing the charged particle beam (7).

20. The focussing lens according to any one of the preceding claims, comprising a second electrode (9, 9a; 107,) having a second aperture (108) for focussing the charged particle beam (7).

21. A charged particle beam device (1) to inspect or structure a specimen (3) at various predetermined landing angles (42) comprising:

a charged particle beam source (5) to generate a charged particle beam (7);

a focussing lens (100) according to any one of the previous claims to focus the charged particle beam (7) onto the specimen (3).

22. The charged particle beam device according to claim 21, comprising a tilting mechanism (22) to tilt the symmetry axis (8) of the focussing lens (100) with respect to the surface of the specimen (3) for inspecting or structuring the specimen (3) between at least two different landing angles (42).

23. The charged particle beam device according to claim 22, whereby the tilting mechanism (22) is capable of tilting the symmetry axis (8) of the focussing lens (100) to provide a vertical landing angle (42) and a tilted landing angle (42) which deviates from the vertical landing angle (42) by at least 20 degrees and preferably by at least 40 degrees.

24. The charged particle beam device according to any one of the claims 22 to 23, whereby the tilting mechanism (22) is capable of providing a tilted landing angle (42) which is half the cone vertex angle (122) of the cone of the cone-like shaped first electrode (105a).

25. The charged particle beam device according to any one of the claims 22 to 24, whereby the symmetry plane (10) of the focussing lens (100) essentially equals the tilting plane (124).

26. A method of inspecting or structuring a specimen (3) by means of a charged particle beam (7) at different landing angles (42) including the steps:

providing a charged particle beam device having a correcting electrode;

inspecting or structuring the specimen at a first landing angle at a first correcting electrode voltage applied to the correcting electrode; and

inspecting or structuring the specimen at a second landing angle at a second correcting electrode voltage applied to the correcting electrode.

27. A method of inspecting or structuring a specimen (3) by means of a charged particle beam (7) at different landing angles (42) including the steps:

providing a charged particle beam device having a first electrode and a correcting electrode;

inspecting or structuring the specimen at a first landing angle with the correcting electrode at a first position with respect to the at least first electrode; and

inspecting or structuring the specimen at a second landing angle with the correcting electrode at a second position with respect to the at least first electrode.

28. The method according to any one of the claims 26 or 27 whereby the charged particle beam device is a charged particle beam device according to any one of the claims 21 to 25.

29. The method according to any one of the claims 26 to 28, whereby the first landing angle is adjusted to be in the range between 70 degrees and 110 degrees, preferably between 80 degrees and 100 and even more preferred between 85 degrees and 95 degrees with respect to the surface of the specimen.

30. The method according to any one of the claims 26 to 29 whereby the second landing angle is adjusted to be in the range between 20 degrees and 70 degrees, preferably between 30

degrees and 60 and even more preferred between 40 degrees and 50 degrees with respect to the surface of the specimen.

31. The method according to any one of the claims 27 to 30, whereby the first correcting electrode voltage is adjusted to be equal to the specimen voltage Vs applied to the specimen, or within the range defined by the voltages between the specimen voltage Vs and the first electrode voltage V1 applied to the first electrode.

32. The method according to any one of the claims 27 to 31, whereby the second correcting electrode voltage is adjusted to be outside of the range defined by the voltages between the specimen voltage Vs applied to the specimen and the first electrode voltage V1 applied to the first electrode.

33. The method according to claim 32 whereby the second correcting electrode voltage is adjusted to a voltage given by 2*Vs-V1 with a tolerance of less than 50 percent, preferably of less than 20 percent, and even more preferred of less than 10 percent.

34. The method according to any one of the claims 26 to 33 whereby the first and/or second landing angles are adjusted by means of the tilting mechanism according to any one of the claims 22 to 25.

35. The method according to any one of the claims 27 to 34 whereby the distance between the second position and the first electrode is larger than the distance between the first position and the first electrode by a factor of at least two, preferably at least 10, and even more preferred by at least 100.

36. A focussing lens (100) for focussing a charged particle beam (7) onto a specimen (3) at a predetermined landing angle (42) comprising:

at least a first electrode (26a, 9a; 105, 105a; 107) having a first aperture (106) to generate a focussing electric field (110) for focussing the charged particle beam (7) onto the specimen (3); and

a correcting electrode having a cone-like shaped curved surface (115) to compensate for landing angle dependent distortions of the focussing electric field (110) caused by the specimen,

whereby the cone-like shaped curved surface (115) of the correcting electrode has an opening (118) on one side to provide space for the specimen (3) to approach the first electrode (26a, 9a; 105, 105a; 107).

37. A method of inspecting or structuring a specimen (3) by means of a charged particle beam (7) at different landing angles (42) including the steps:

providing a charged particle beam device having a first electrode having a first electrode voltage V1, and a correcting electrode;

providing a specimen having a specimen voltage Vs;

inspecting or structuring the specimen at a first landing angle at a first correcting electrode voltage applied to the correcting electrode; and

inspecting or structuring the specimen at a second landing angle at a second correcting electrode voltage applied to the correcting electrode, whereby the second correcting electrode voltage is adjusted to a voltage given by 2*Vs-V1 with a tolerance of less than 50 percent.

38. A method of inspecting or structuring a specimen (3) by means of a charged particle beam (7) at different landing angles (42) including the steps:

providing a charged particle beam device having a first electrode having a first electrode voltage V1, and a correcting electrode;

providing a specimen having a specimen voltage Vs;

inspecting or structuring the specimen at a first landing angle with the correcting electrode at a first position with respect to the at least first electrode; and

inspecting or structuring the specimen at a second landing angle with the correcting electrode at a second position with respect to the at least first electrode, whereby the second correcting electrode voltage is adjusted to a voltage given by 2*Vs-V1 with a tolerance of less than 50 percent.